FORM PTO-1390 (Modified) (REV 10-95) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR
1704	09/889345

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE 00/03913	NOVEMBER 9, 2000	NOVEMBER 16, 1999

TITLE OF INVENTION
DEVICE FOR CONNECTING A SHAFT TO A RING

APPLICANT(S) FOR DO/EO/US
Gustav RUSCHMANN, Matthias NOELTER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☒ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 18 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
    A **SECOND** or **SUBSEQUENT** preliminary amendment.
16. ☐ A substitute specification.
17. ☐ A change of power of attorney and/or address letter.
18. ☒ Certificate of Mailing by Express Mail
19. ☐ Other items or information:

EL 364015669 US

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/889345	PCT/DE 00/03913	1704

20. The following fees are submitted:.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
☐	Search Report has been prepared by the EPO or JPO	**$930.00**
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482)	**$720.00**
☐	No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2))	**$790.00**
☒	Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2) paid to USPTO	**$1,070.00**
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)	**$98.00**

ENTER APPROPRIATE BASIC FEE AMOUNT =	**$1,000.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	**$0.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	10 - 20 =	0	x $18.00	**$0.00**	
Independent claims	1 - 3 =	0	x $80.00	**$0.00**	
Multiple Dependent Claims **(check if applicable).**			☐	**$0.00**	
	TOTAL OF ABOVE CALCULATIONS =			**$1,000.00**	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) **(check if applicable).**			☐	**$0.00**	
	SUBTOTAL =			**$1,000.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).			+	**$0.00**	
	TOTAL NATIONAL FEE =			**$1,000.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).**			☐	**$0.00**	
	TOTAL FEES ENCLOSED =			**$1,000.00**	
				Amount to be: refunded	$
				charged	$

☐ A check in the amount of to cover the above fees is enclosed.

☒ Please charge my Deposit Account No. **19-4675** in the amount of **$1,000.00** to cover the above fees.
A duplicate copy of this sheet is enclosed.

☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **19-4675** A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

STRIKER, STRIKER & STENBY
103 EAST NECK ROAD
HUNTINGTON, NEW YORK 11743

SIGNATURE

MICHAEL J. STRIKER
NAME

27233
REGISTRATION NUMBER

JULY 16, 2001
DATE

UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner: Group: Attorney Docket # 1704

Applicant(s) : RUSCHMANN, G., ET AL

Serial No. :

Filed : Simultaneously

For : DEVICE FOR CONNECTING A SHAFT TO A RING

SIMULTANEOUS AMENDMENT

July 16, 2001

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

S I R S:

Simultaneously with filing of the above identified application please amend the same as follows:

In the Claims:

Cancel all claims without prejudice.

Substitute the claims attached hereto.

REMARKS:

This Amendment is submitted simultaneously with filing of the above identified application.

With the present Amendment applicant has amended the claims so as to eliminate their multiple dependency.

Consideration and allowance of the present application is most respectfully requested.

Respectfully submitted,

Michael J. Striker
Attorney for Applicant(s)
Reg. No. 27233

UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner: Group: Attorney Docket # 1704

Applicant(s) : RUSCHMANN, G., ET AL

Serial No. : 09/889,345

Filed : 07/16/2001

For : DEVICE FOR CONNECTING A SHAFT TO A RING

SIMULTANEOUS AMENDMENT

October 17, 2001

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

S I R S:

Simultaneously with filing of the above identified application please amend the same as follows:

In the Claims:

Cancel all claims without prejudice.

Substitute the claims attached hereto.

REMARKS:

This Amendment is submitted simultaneously with filing of the above identified application.

With the present Amendment applicant has amended the claims so as to eliminate their multiple dependency.

Consideration and allowance of the present application is most respectfully requested.

Respectfully submitted,

Michael J. Striker
Attorney for Applicant(s)
Reg. No. 27233

Claims

1. A device for connecting a shaft (10), in particular a worm shaft, to a ring (12), in particular a ring magnet, which has an inside face (14) that is in contact with an outside face (16) of the shaft (10),

characterized in that

on the outside face (16) of the shaft (10), there are deformation regions (18), by means of which a nonpositive-engagement, rotationally fixed connection of the ring (12) to the shaft (10) is assured.

2. The device of claim 1, characterized in that the deformation regions (18) are distributed regularly in the radial direction over the outside face (16) of the shaft (10).

3. The device of claim 1 [or 2], characterized in that the deformation regions are formed by at least two impressed features (18).

4. The device of claim 3, characterized in that the impressed features (18) have a conical shape.

5. The device of claim 4, characterized in that the cone of the impressed features (18) is between 50° and 70°, and is preferably 60°.

6. The device of claim 4 [or 5], characterized in that the maximum diameter of the impressed features (18) is between 1.5 mm and 2.4 mm, and is preferably 1.9 mm.

7. The device of [one of claims 3-6] claim 3, characterized in that two of the impressed features (18) at a time are disposed in pairs.

8. The device of [one of claims 3-7] claim 3, characterized in that the impressed features (18) are offset by 180° from one another.

9. The device of [one of the foregoing claims] claim 1, characterized in that the deformation regions (18) are disposed approximately centrally in the axial direction to the inside face (14).

10. The device of [one of the foregoing claims] claim 1, characterized in that in addition to the impressed features (18), radially extending indentations (20) are present on the outside face (16) of the shaft (10).

Claims

1. A device for connecting a shaft (10), in particular a worm shaft, to a ring (12), in particular a ring magnet, which has an inside face (14) that is in contact with an outside face (16) of the shaft (10),

characterized in that

on the outside face (16) of the shaft (10), there are deformation regions (18), by means of which a nonpositive-engagement, rotationally fixed connection of the ring (12) to the shaft (10) is assured.

2. The device of claim 1, characterized in that the deformation regions (18) are distributed regularly in the radial direction over the outside face (16) of the shaft (10).

3. The device of claim 1, characterized in that the deformation regions are formed by at least two impressed features (18).

4. The device of claim 3, characterized in that the impressed features (18) have a conical shape.

5. The device of claim 4, characterized in that the cone of the impressed features (18) is between 50° and 70°, and is preferably 60°.

6. The device of claim 4, characterized in that the maximum diameter of the impressed features (18) is between 1.5 mm and 2.4 mm, and is preferably 1.9 mm.

7. The device of claim 3, characterized in that two of the impressed features (18) at a time are disposed in pairs.

8. The device of claim 3, characterized in that the impressed features (18) are offset by 180° from one another.

9. The device of claim 1, characterized in that the deformation regions (18) are disposed approximately centrally in the axial direction to the inside face (14).

10. The device of claim 1, characterized in that in addition to the impressed features (18), radially extending indentations (20) are present on the outside face (16) of the shaft (10).

September 5, 2001

DECLARATION

The undersigned, Jan McLin Clayberg, having an office at 5316 Little Falls Road, Arlington, VA 22207-1522, hereby states that she is well acquainted with both the English and German languages and that the attached is a true translation to the best of her knowledge and ability of international patent application PCT/DE 00/03913 of RUSCHMANN, G., ET AL., entitled "DEVICE FOR CONNECTING A SHAFT TO A RING".

The undersigned further declares that the above statement is true; and further, that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.

Jan McLin Clayberg

DEVICE FOR CONNECTING A SHAFT TO A RING

Prior Art

The invention relates to a device for connecting a shaft, in particular a worm shaft, to a ring, in particular a ring magnet, as generically defined by the preamble to the main claim.

Various techniques for connecting a ring to a shaft by nonpositive engagement in a rotationally fixed manner are known. One current method is to secure and fix the ring to the shaft with adhesive, but its metering and manipulation is very complicated and involves high maintenance and repair costs. Moreover, there is the risk that the connection will come undone because of aging processes.

Another known technique is, after the mounting of the ring, to calk the shaft afterward and in this way to securely fix the ring. In the process, however, it can happen that the already fully mounted ring will suffer damage and in the worst case be destroyed.

Advantages of the Invention

The device according to the invention for connecting a shaft, in particular a worm shaft, to a ring, in particular a ring magnet, having the characteristics of the main claim has the advantage that mounting the ring is accomplished substantially more easily, securely and effectively in comparison to the known connecting devices. This is achieved by means of deformation regions, which are present on the outside face of the shaft that is in contact with the inside

face of the ring and that are already applied to the shaft before the ring is actually mounted.

Another advantage is that adhesives that are environmentally harmful, for instance, can be omitted in the assembly process. As a result, the corresponding mounting devices require much less maintenance.

A very great advantage is also considered to be that armature imbalances caused by uneven distributions of adhesive are already avoided from the outset.

In comparison to the later calking of the shaft, the application according to the invention of the deformation regions before the actual mounting of the ring or ring magnet has the advantage of very greatly reducing the risk of breakage or destruction of the ring magnet.

By the provisions recited in the dependent claims, advantageous refinements of the device defined by the main claim are possible.

For instance, it is extremely advantageous if the deformation regions are distributed regularly in the radial direction over the outside face of the shaft. This guarantees an optimal hold of the ring on the shaft and distributes the load continuously over the ring.

It has proved especially advantageous if the deformation regions are formed by at least two impressed features. These impressed features can be pressed, with an impressing die, into the outside face of the shaft that is to be brought into contact with the inside face of the ring. In the process, the shaft radius increases at the edges of these

impressed features, and thus once the ring is mounted on the shaft, a rotationally fixed, nonpositive connection between the ring and the shaft is assured.

Especially suitable deformation of the shaft material is attained if the impressed features have a conical shape. It is especially advantageous if the cone of the impressed features is between 50° and 70°, and preferably is 60°. Advantageously, the maximum diameter of the impressed features is between 1.5 mm and 2.4 mm, and preferably is 1.9 mm. With these measurements, the best results can be attained with regard to the nonpositive engagement or rotational fixation of the ring to the shaft.

With regard to the disposition of the impressed features, pairs of impressed features located side by side have proved to be especially advantageous. If these double impressed features are moreover offset by 180° from one another, then an optimal security against torsion and displacement of the ring on the shaft is attained.

Advantageously, the deformation regions are disposed approximately centrally in the axial direction to the inside face. A further advantage is obtained whenever in addition to the impressed features, radially extending indentations are present on the outside face of the shaft. The security of the ring against displacement in the axial direction is thus reinforced.

The shape of the impressed features is naturally not limited to the conical shape. Still other shapes are conceivable, such as impressed features in the shape of notches. What is important is only that there be the simplest and securest possible connection of the ring to the

shaft.

Drawing

In the drawing, two exemplary embodiments of a device of the invention are shown, and they are explained in further detail in the ensuing description.

Shown are

Fig. 1, schematically, a device according to the invention in the first exemplary embodiment, and a section taken along the line A-A;

Fig. 2, an enlarged view of the section; and

Fig. 3, a second exemplary embodiment.

Description

The first exemplary embodiment, shown in Fig. 1, of a device of the invention has a shaft 10, with an outside face 16, as well as a ring 12, with an inside face 14. Two double impressed features, each with a conical shape, are embodied on the outside face 16 of the shaft 10. In the section taken along the line A-A, it is clearly seen that the two double impressed features are offset by 180° from one another.

The cone of the respective impressed features is 60°, while its diameter d is 1.9 mm.

The double impressed features 18 are made by machine on the shaft using an impressing die during the production process. The impressing process causes a deformation of the

shaft material, and regions that have a greater shaft radius than the remainder of the shaft form.

The deformation regions are shown in an enlarged view in Fig. 2, in which the protrusions 19 formed as a result of the impressing operation are shown with an exaggerated height. It can be seen clearly that the material of the shaft becomes deformed especially in the region of the edges of the impressed features 18.

In the second exemplary embodiment shown in Fig. 3, in which the same characteristics are identified by the same reference numerals, in addition to the conical double impressed features 18 there is an indentation 20 extending radially around the shaft 10. This indentation 20 can be utilized to assure an additional hold in the axial direction, for instance by injecting adhesive into the indentation.

Claims

1. A device for connecting a shaft (10), in particular a worm shaft, to a ring (12), in particular a ring magnet, which has an inside face (14) that is in contact with an outside face (16) of the shaft (10),

characterized in that

on the outside face (16) of the shaft (10), there are deformation regions (18), by means of which a nonpositive-engagement, rotationally fixed connection of the ring (12) to the shaft (10) is assured.

2. The device of claim 1, characterized in that the deformation regions (18) are distributed regularly in the radial direction over the outside face (16) of the shaft (10).

3. The device of claim 1 or 2, characterized in that the deformation regions are formed by at least two impressed features (18).

4. The device of claim 3, characterized in that the impressed features (18) have a conical shape.

5. The device of claim 4, characterized in that the cone of the impressed features (18) is between 50° and 70°, and is preferably 60°.

6. The device of claim 4 or 5, characterized in that the maximum diameter of the impressed features (18) is between 1.5 mm and 2.4 mm, and is preferably 1.9 mm.

7. The device of one of claims 3-6, characterized in that two of the impressed features (18) at a time are disposed in pairs.

8. The device of one of claims 3-7, characterized in that the impressed features (18) are offset by 180° from one another.

9. The device of one of the foregoing claims, characterized in that the deformation regions (18) are disposed approximately centrally in the axial direction to the inside face (14).

10. The device of one of the foregoing claims, characterized in that in addition to the impressed features (18), radially extending indentations (20) are present on the outside face (16) of the shaft (10).

DECLARATION AND POWER OF ATTORNEY FOR NATIONAL STAGE OF PCT PATENT APPLICATION

As a below-named inventor, I hereby declare that:

Gustav RUSCHMANN
Matthias NOELTNER

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **DEVICE FOR CONNECTING A SHAFT TO A RING** the specification of which was filed as PCT International Application number PCT/DE 00/03913 on November 9, 2000.

I hereby state that I believe the named inventor or inventors in this Declaration to be the original and first inventor or inventors of the subject matter which is claimed and for which a patent is sought.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365 (b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior foreign application(s):			Priority claimed:	
199 54 969.9	GERMANY	NOVEMBER 16, 1999	X	
(Number)	(Country)	(Date filed)	Yes	No
(Number)	(Country)	(Date filed)	Yes	No

As a named inventor, I hereby appoint the following attorney to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

(1) Michael J. Striker, Reg. No. 27233

Direct all telephone calls to Striker, Striker & Stenby at telephone no.: (631) 549 4700 and address and all correspondence to:

STRIKER, STRIKER & STENBY
103 East Neck Road
Huntington, New York 11743
U.S.A.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statement may jeopardize the validity of the application or any patent issued thereon.

Signature: Gustav Ruschmann	Date: 02.08.01	Residence and Full Postal Address: Strassburger Strasse 22 77871 Renchen Germany DEX
Full Name of First or Sole Inventor: Gustav RUSCHMANN	Citizenship: GERMAN	
Signature: Matthias Noeltner	Date: 02.08.01	Residence and Full Postal Address: Mooser Strasse 41 77839 Lichtenau Germany DEX
Full Name of Second Inventor: Matthias ~~NOELTER~~ NOELTNER	Citizenship: GERMAN	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Third Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Fourth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Fifth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Sixth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Seventh Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Eighth Inventor:	Citizenship:	
Signature:	Date:	Residence and Full Postal Address:
Full Name of Ninth Inventor:	Citizenship:	